

```
<class 'pandas.core.frame.DataFrame'>
```

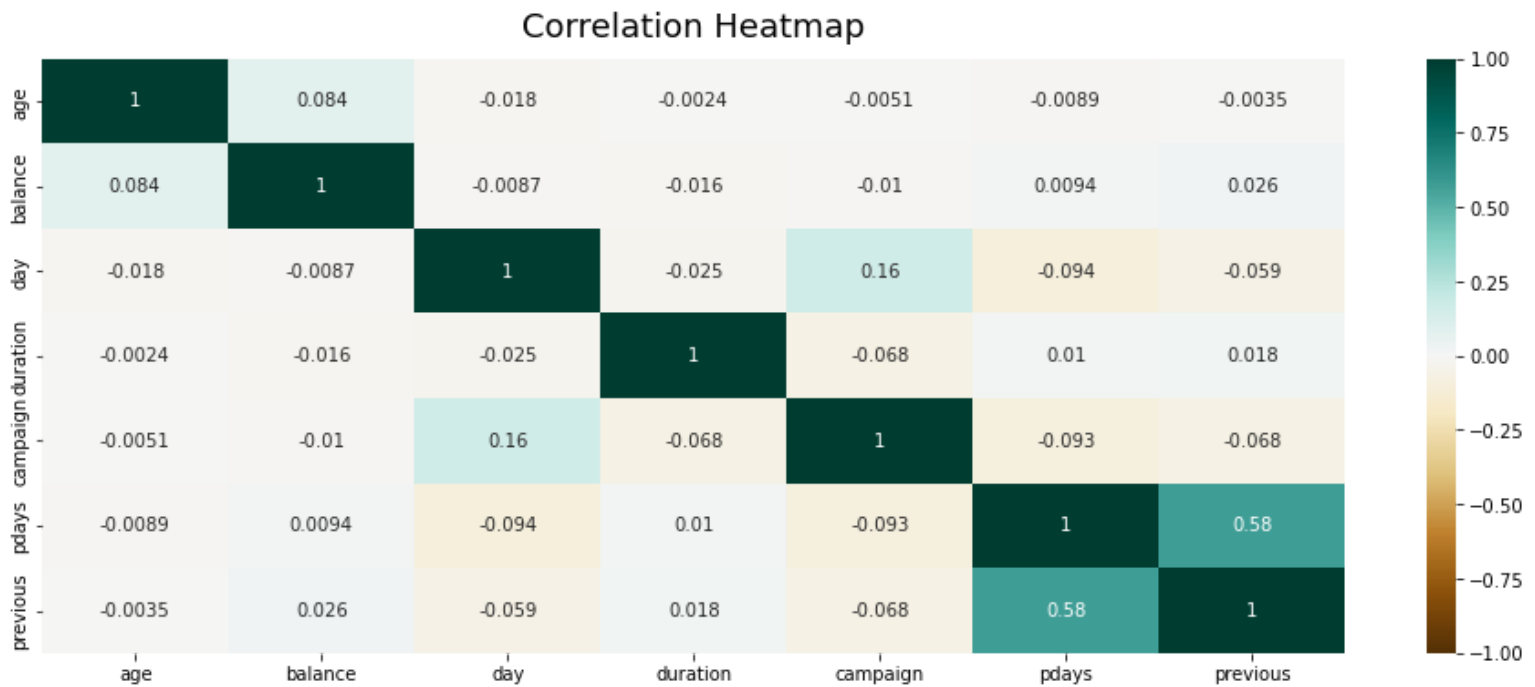
```
RangeIndex: 4521 entries, 0 to 4520
```

```
Data columns (total 43 columns):
```

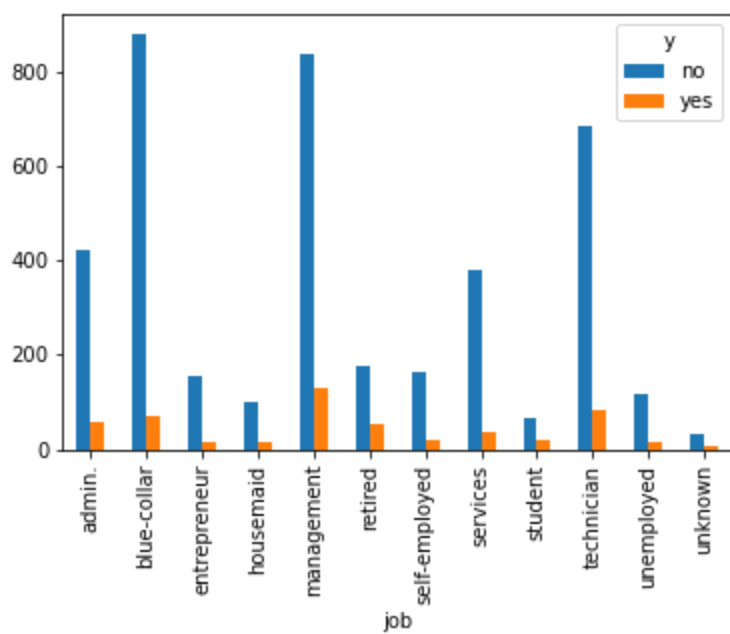
#	Column	Non-Null Count	Dtype
0	age	4521 non-null	int64
1	balance	4521 non-null	int64
2	day	4521 non-null	int64
3	duration	4521 non-null	int64
4	campaign	4521 non-null	int64
5	pdays	4521 non-null	int64
6	previous	4521 non-null	int64
7	job_blue-collar	4521 non-null	uint8
8	job_entrepreneur	4521 non-null	uint8
9	job_housemaid	4521 non-null	uint8
10	job_management	4521 non-null	uint8

```
11 job_retired          4521 non-null   uint8
12 job_self-employed    4521 non-null   uint8
13 job_services         4521 non-null   uint8
14 job_student          4521 non-null   uint8
15 job_technician       4521 non-null   uint8
16 job_unemployed       4521 non-null   uint8
17 job_unknown          4521 non-null   uint8
18 marital_married      4521 non-null   uint8
19 marital_single       4521 non-null   uint8
20 education_secondary  4521 non-null   uint8
21 education_tertiary   4521 non-null   uint8
22 education_unknown    4521 non-null   uint8
23 default_yes          4521 non-null   uint8
24 housing_yes          4521 non-null   uint8
25 loan_yes             4521 non-null   uint8
26 contact_telephone    4521 non-null   uint8
27 contact_unknown      4521 non-null   uint8
28 month_aug            4521 non-null   uint8
29 month_dec            4521 non-null   uint8
30 month_feb            4521 non-null   uint8
31 month_jan            4521 non-null   uint8
32 month_jul            4521 non-null   uint8
33 month_jun            4521 non-null   uint8
34 month_mar            4521 non-null   uint8
35 month_may            4521 non-null   uint8
36 month_nov            4521 non-null   uint8
37 month_oct            4521 non-null   uint8
38 month_sep            4521 non-null   uint8
39 poutcome_other       4521 non-null   uint8
40 poutcome_success     4521 non-null   uint8
41 poutcome_unknown     4521 non-null   uint8
42 y_yes                4521 non-null   uint8
```

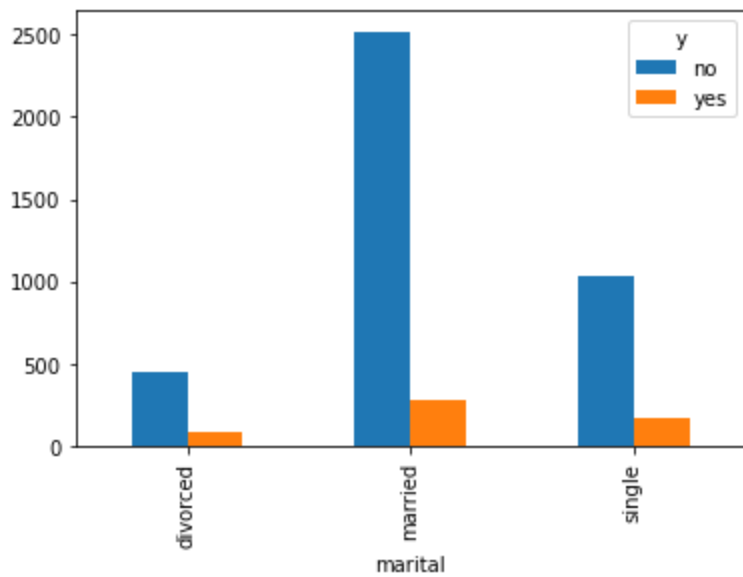
dtypes: int64(7), uint8(36)
memory usage: 406.3 KB



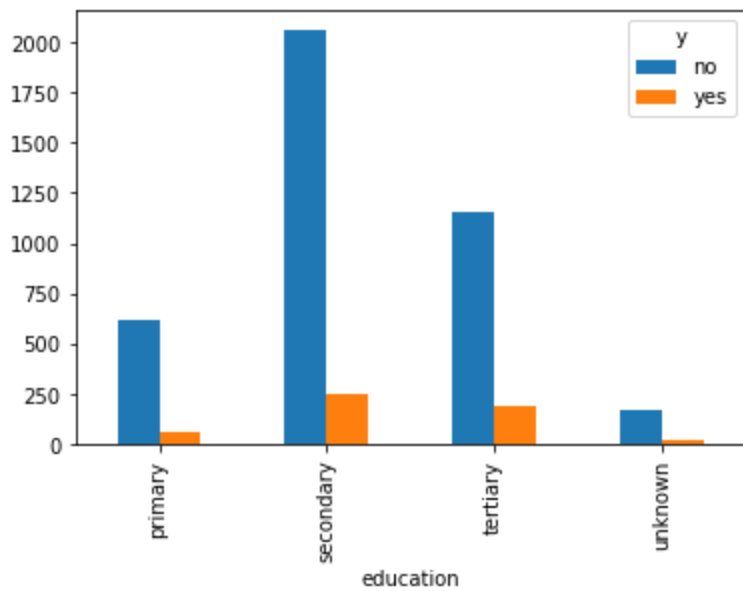
AxesSubplot(0.125,0.125;0.775x0.755)



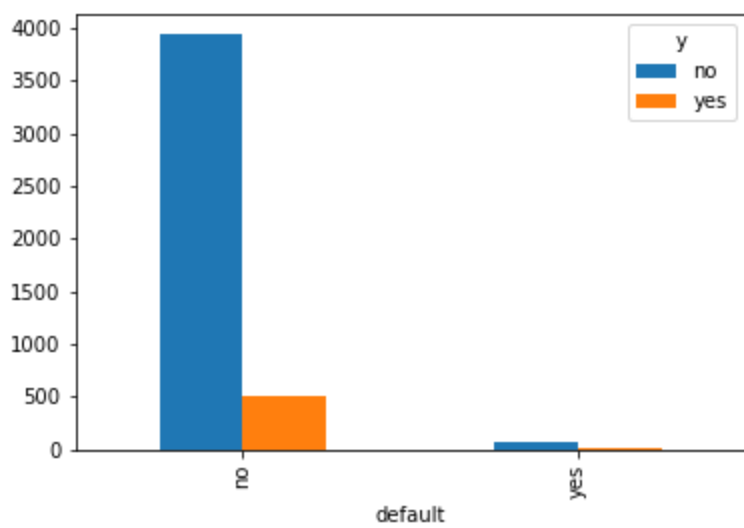
AxesSubplot(0.125,0.125;0.775x0.755)



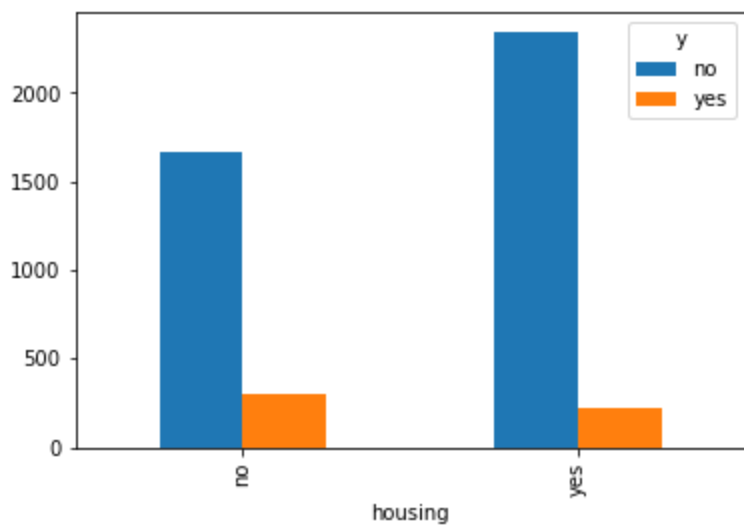
AxesSubplot(0.125,0.125;0.775x0.755)



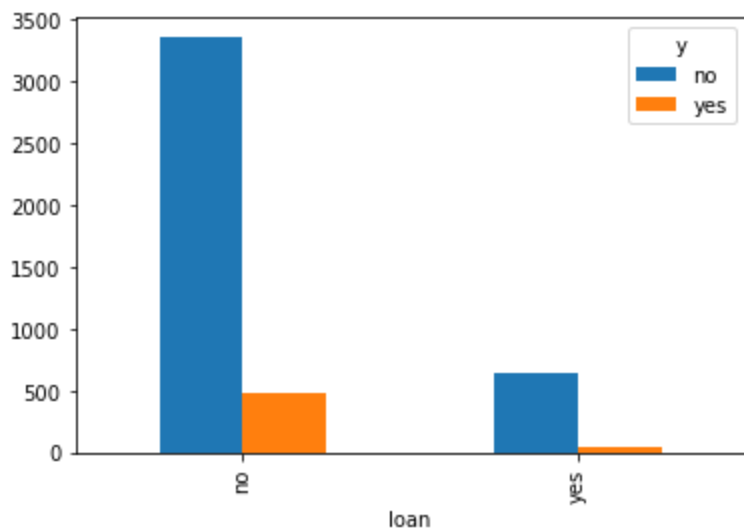
AxesSubplot(0.125,0.125;0.775x0.755)



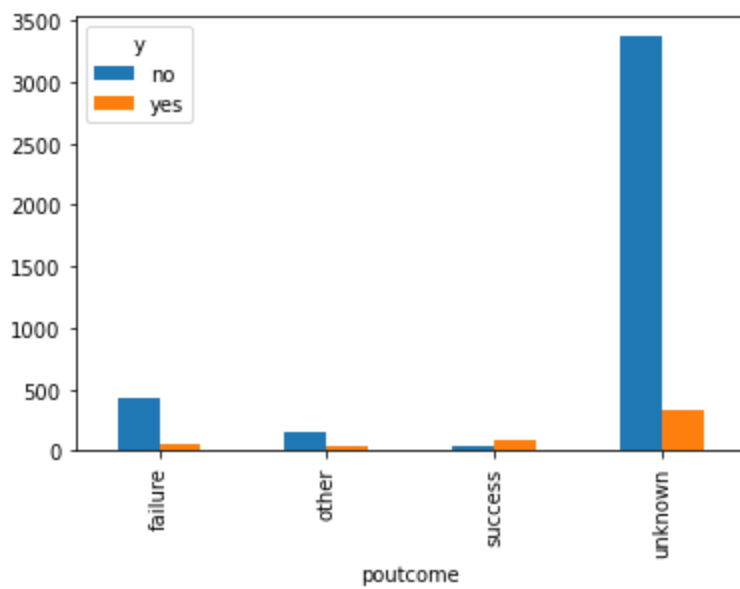
AxesSubplot(0.125,0.125;0.775x0.755)



AxesSubplot(0.125,0.125;0.775x0.755)



AxesSubplot(0.125,0.125;0.775x0.755)



```
Index(['age', 'job', 'marital', 'education', 'default', 'balance', 'housing',
      'loan', 'contact', 'day', 'month', 'duration', 'campaign', 'pdays',
      'previous', 'poutcome', 'y'],
      dtype='object')
```

```
0    4000
1     521
Name: y_yes, dtype: int64
```

```
0    2999
1     391
Name: y_yes, dtype: int64
```

▼ SVC

SVC(gamma='auto')

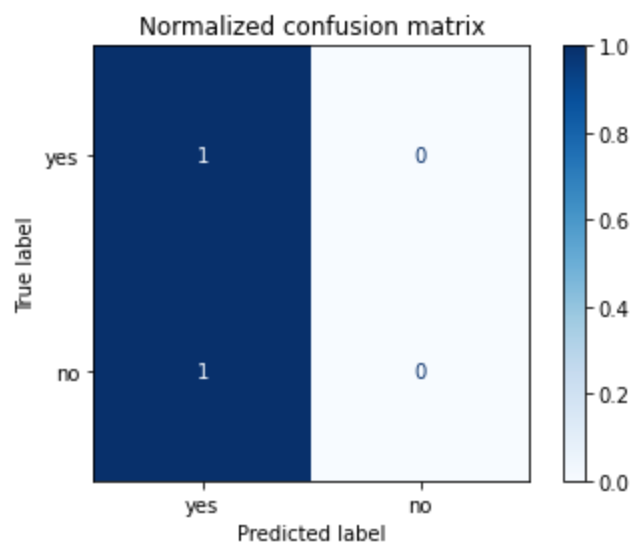
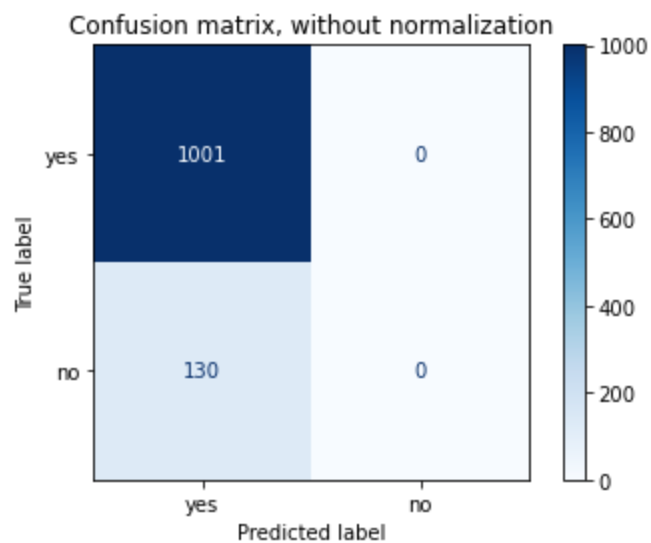
El accuracy de test es: 88.50574712643679%

Confusion matrix, without normalization

```
[[1001    0]
 [ 130    0]]
```

Normalized confusion matrix

```
[[1.  0.]
 [1.  0.]]
```



```
RandomForestRegressor(max_depth=20, max_features=11, n_estimators=146,
                      random_state=123)
```

El accuracy de test es: 90.36251105216623%

Confusion matrix, without normalization

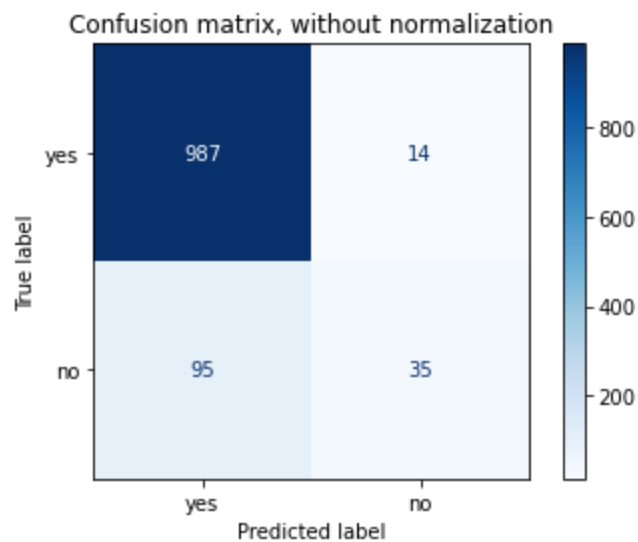
```
[[987  14]
```

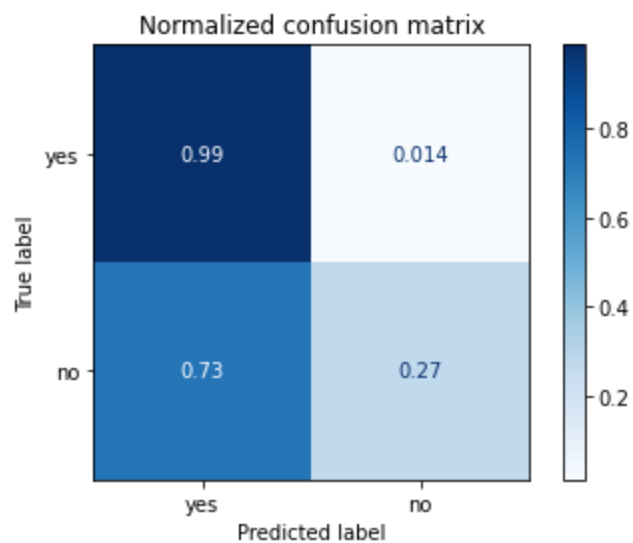
```
 [ 95  35]]
```

Normalized confusion matrix

```
[[0.99 0.01]
```

```
 [0.73 0.27]]
```





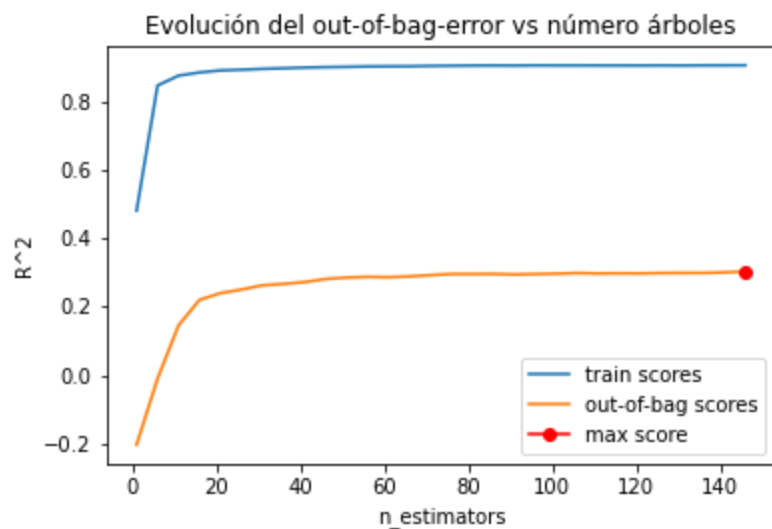
Random forest

RandomForestRegressor

```
RandomForestRegressor(criterion='mse', max_features='auto', n_estimators=10,  
n_jobs=-1, random_state=123)
```

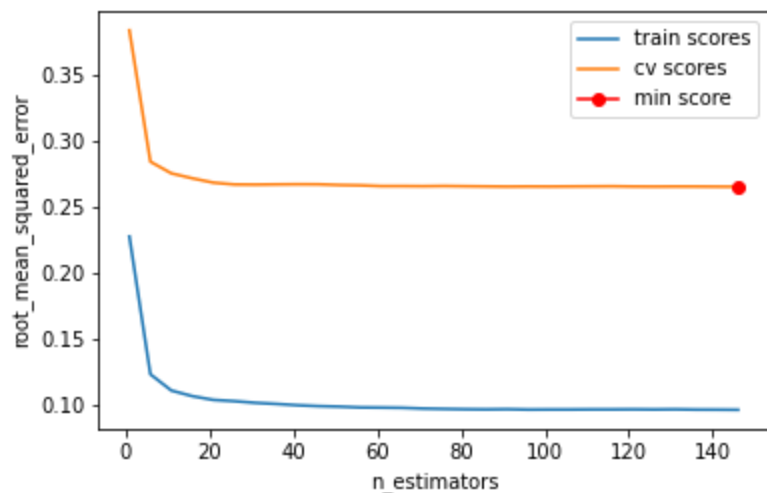
El error (rmse) de test es: 0.28743483527642705

Valor óptimo de `n_estimators`: 146



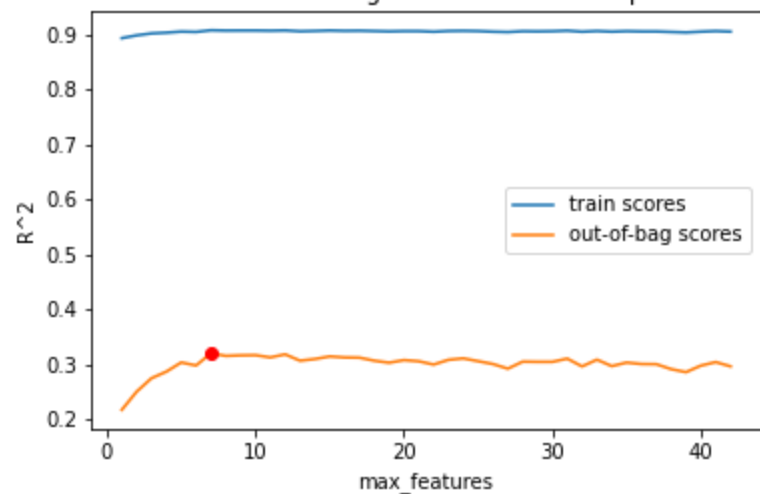
Valor óptimo de `n_estimators`: 146

Evolución del cv-error vs número árboles



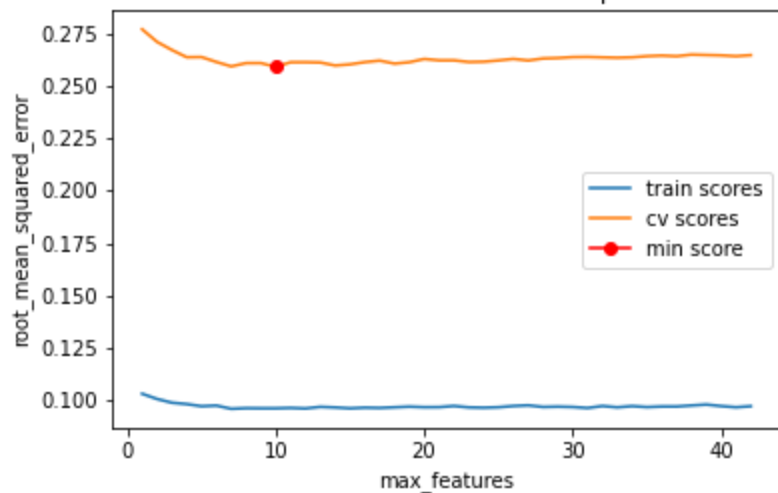
Valor óptimo de max_features: 7

Evolución del out-of-bag-error vs número de predictores



Valor óptimo de max_features: 10

Evolución del cv-error vs número de predictores



```
{'max_depth': None, 'max_features': 11, 'n_estimators': 146}
```

El nuevo error (rmse) de test es: 0.27922656563195436

versus el modelo estandar aplicado anteriormente: 0.28743483527642705

Se ah conseguido reducir el error en 0.008208269644472688

Redes neuronales

Model: "sequential_1"

Layer (type)	Output Shape	Param #
dense_5 (Dense)	(None, 50)	2150
dense_6 (Dense)	(None, 40)	2040
dense_7 (Dense)	(None, 40)	1640
dense_8 (Dense)	(None, 40)	1640
dense_9 (Dense)	(None, 1)	41

Total params: 7,511
Trainable params: 7,511
Non-trainable params: 0

36/36 [=====] - 0s 1ms/step
106/106 [=====] - 0s 1ms/step - loss: 0.2014 - accuracy: 0.9136
[0.20141176879405975, 0.9135693311691284]